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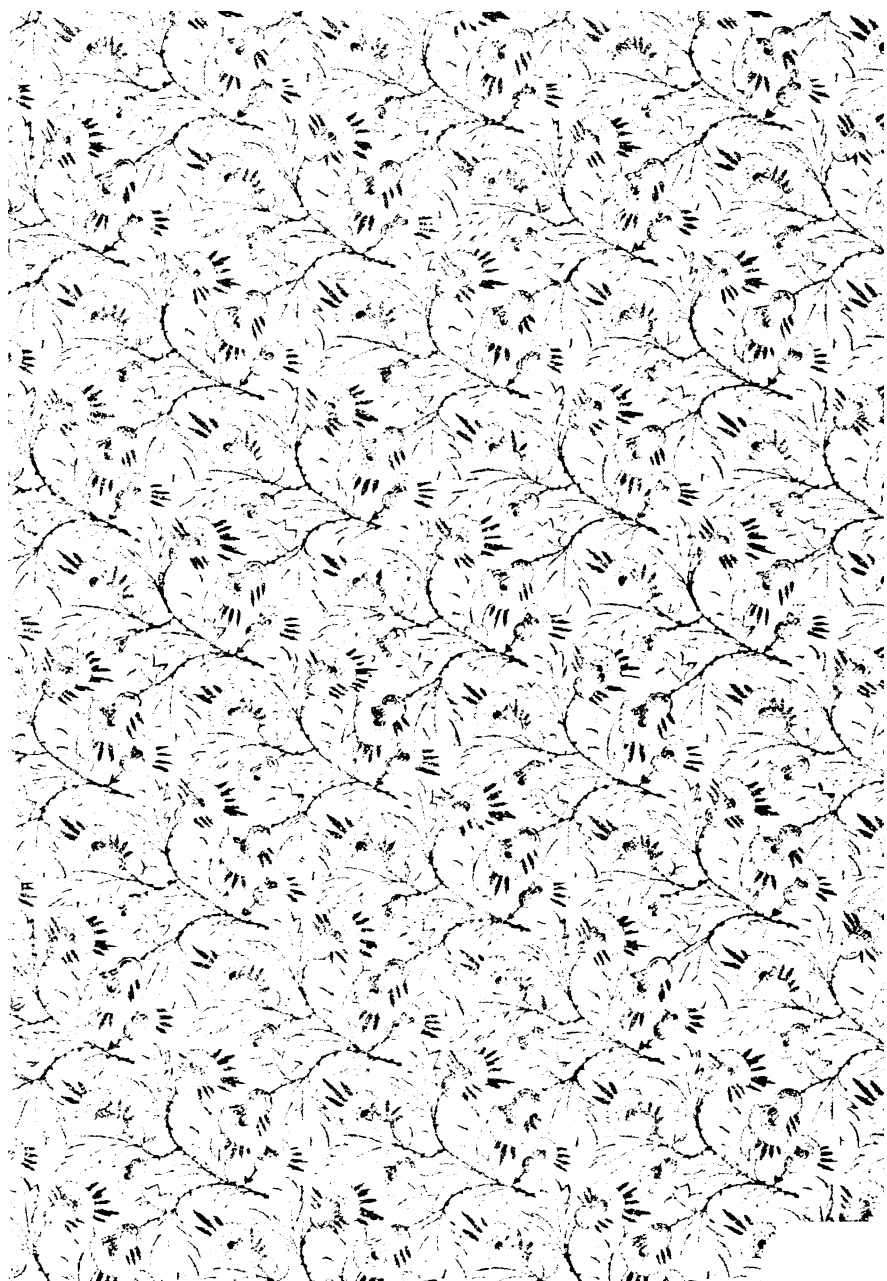
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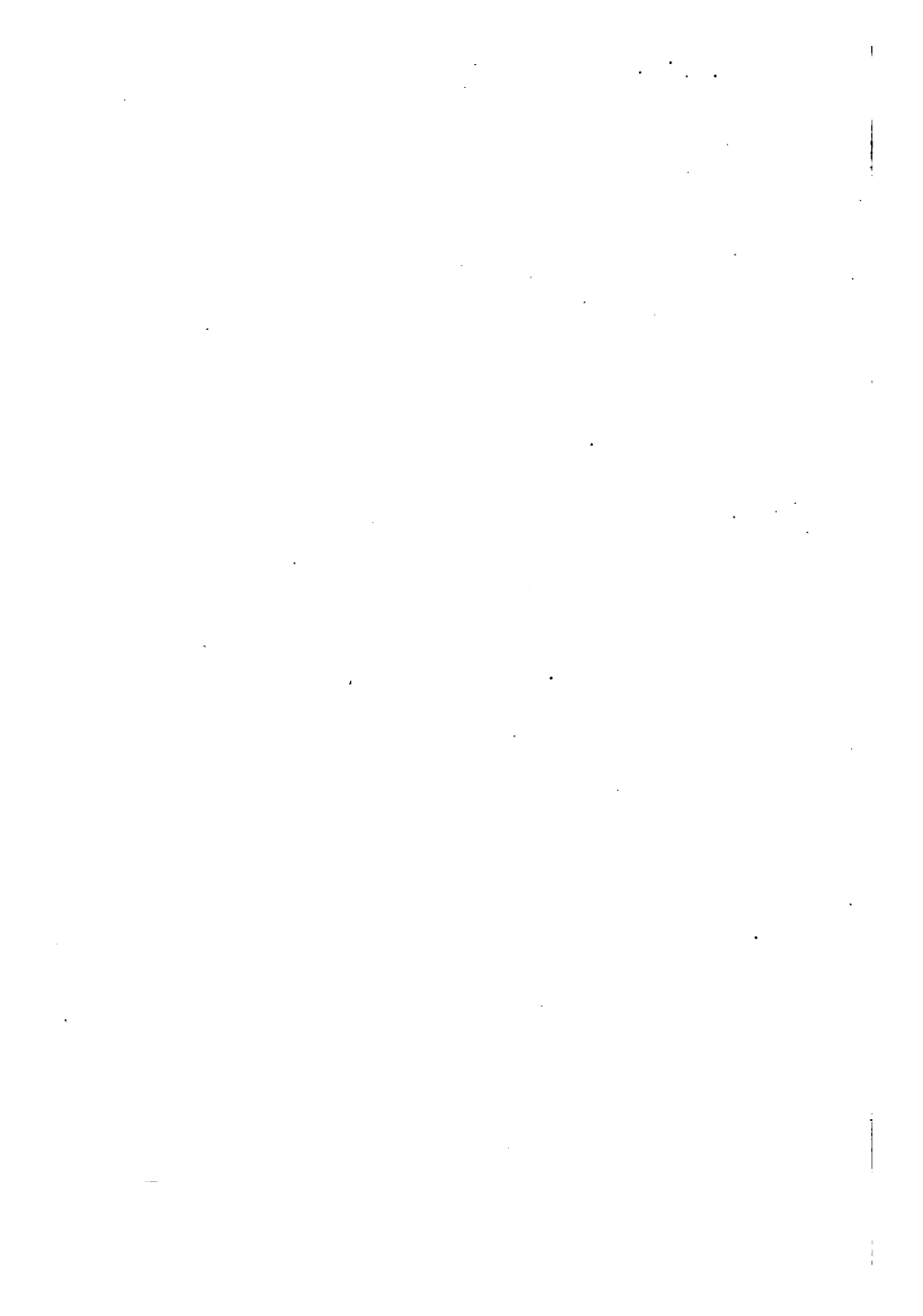
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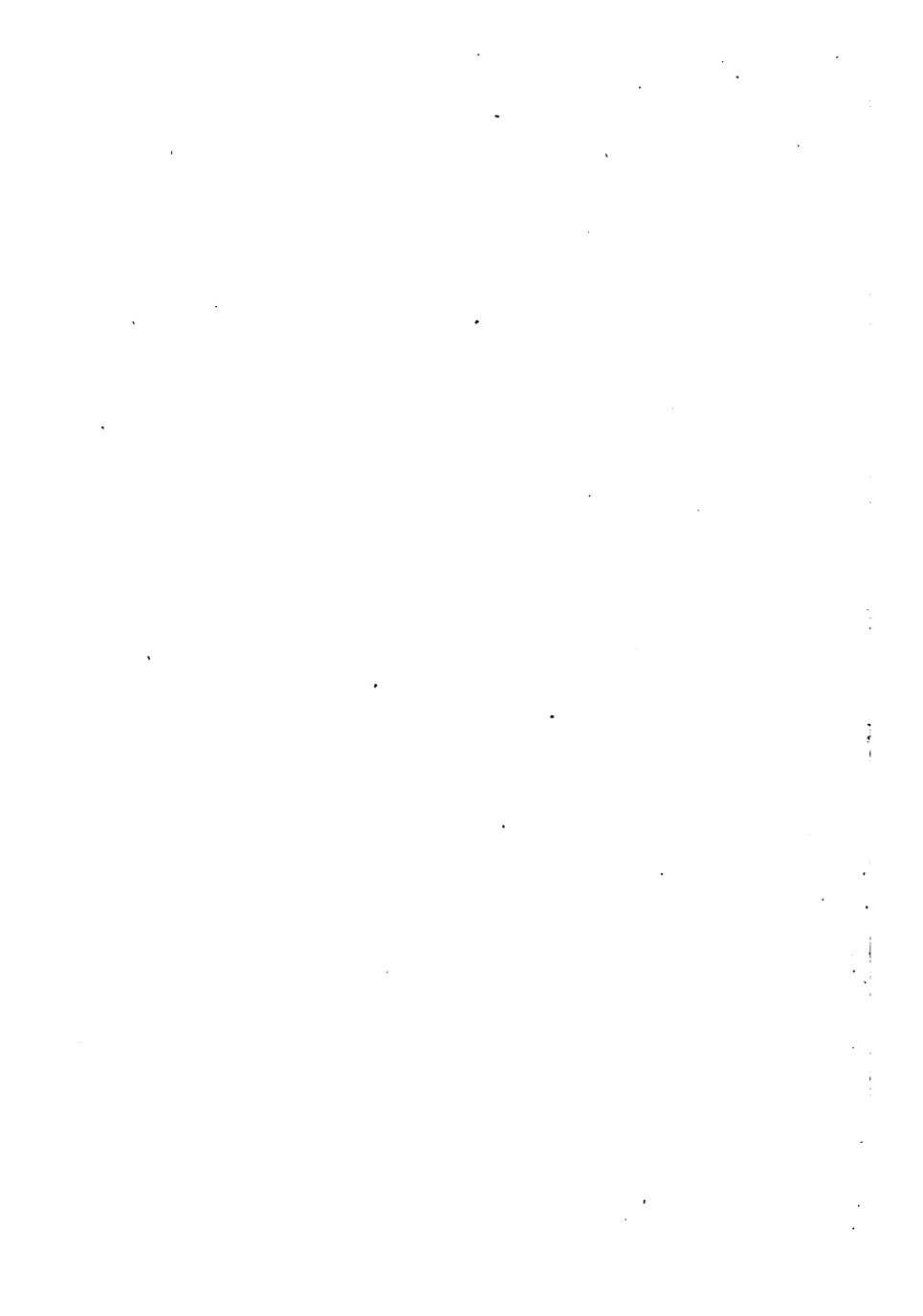




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From Pres. Angell

Dec. 9, 1893

FORCE.



ANOTHER VOYAGE OF DISCOVERY.

MADISON, WISCONSIN.

1893.

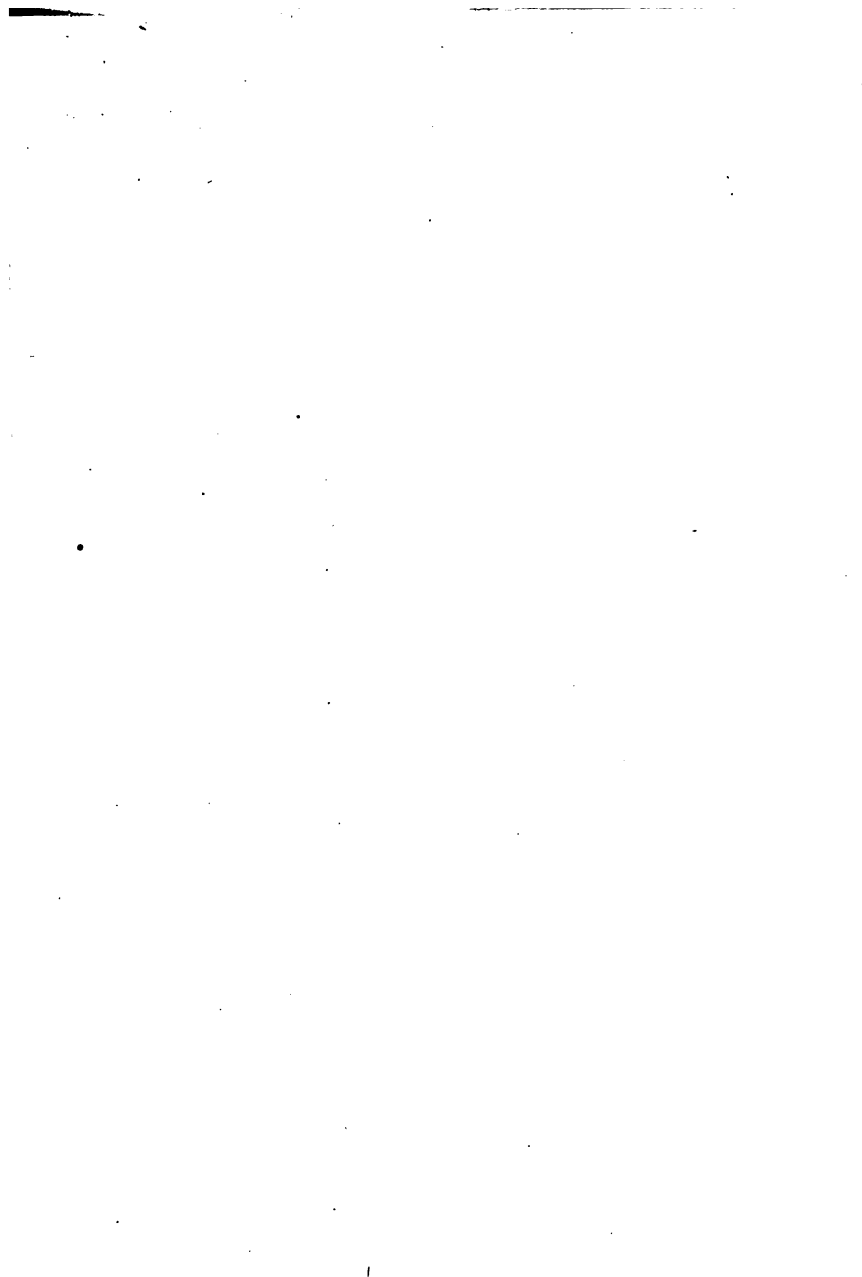
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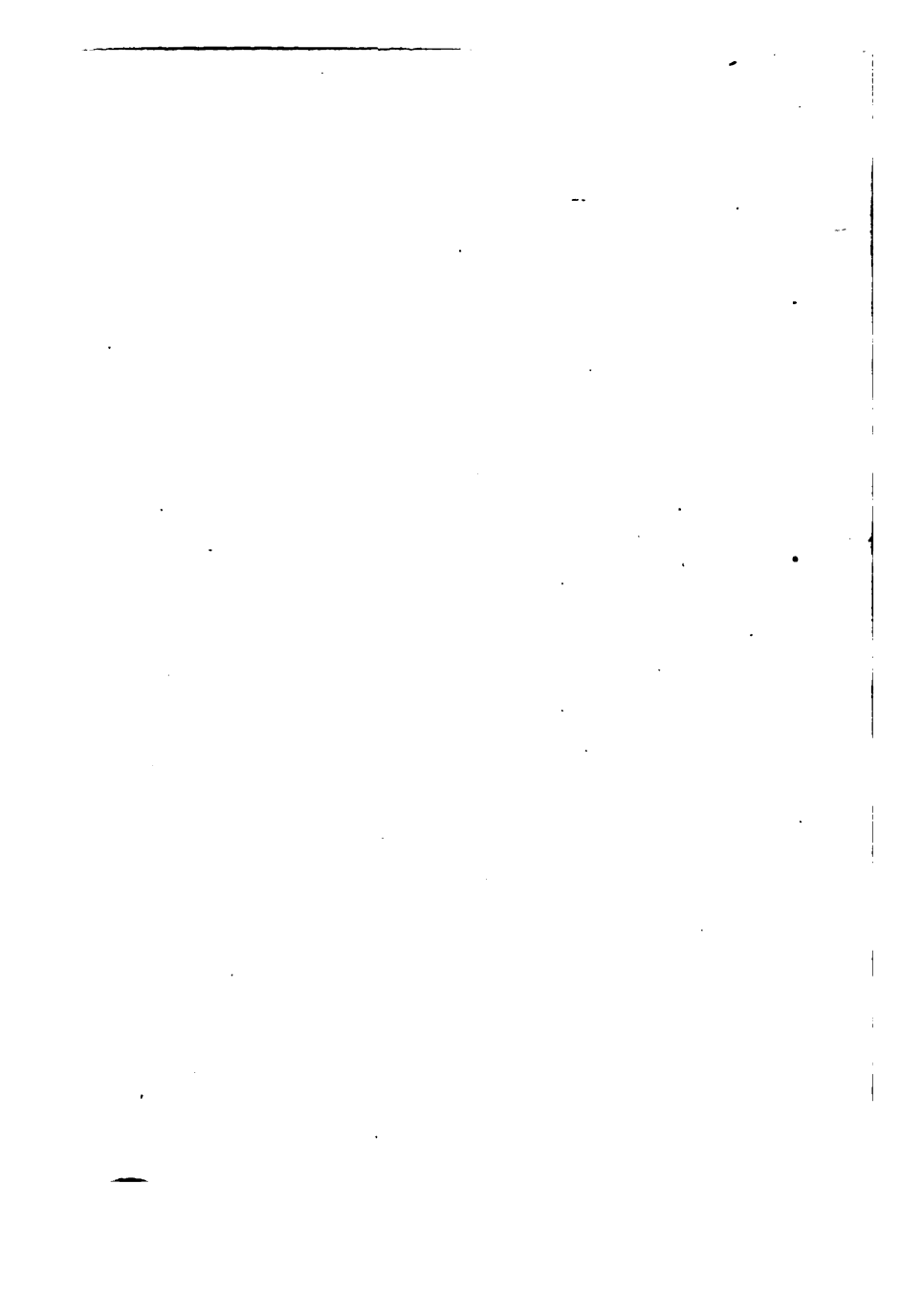
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FORCE.

BY

SIMEON MILLS.



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1893.



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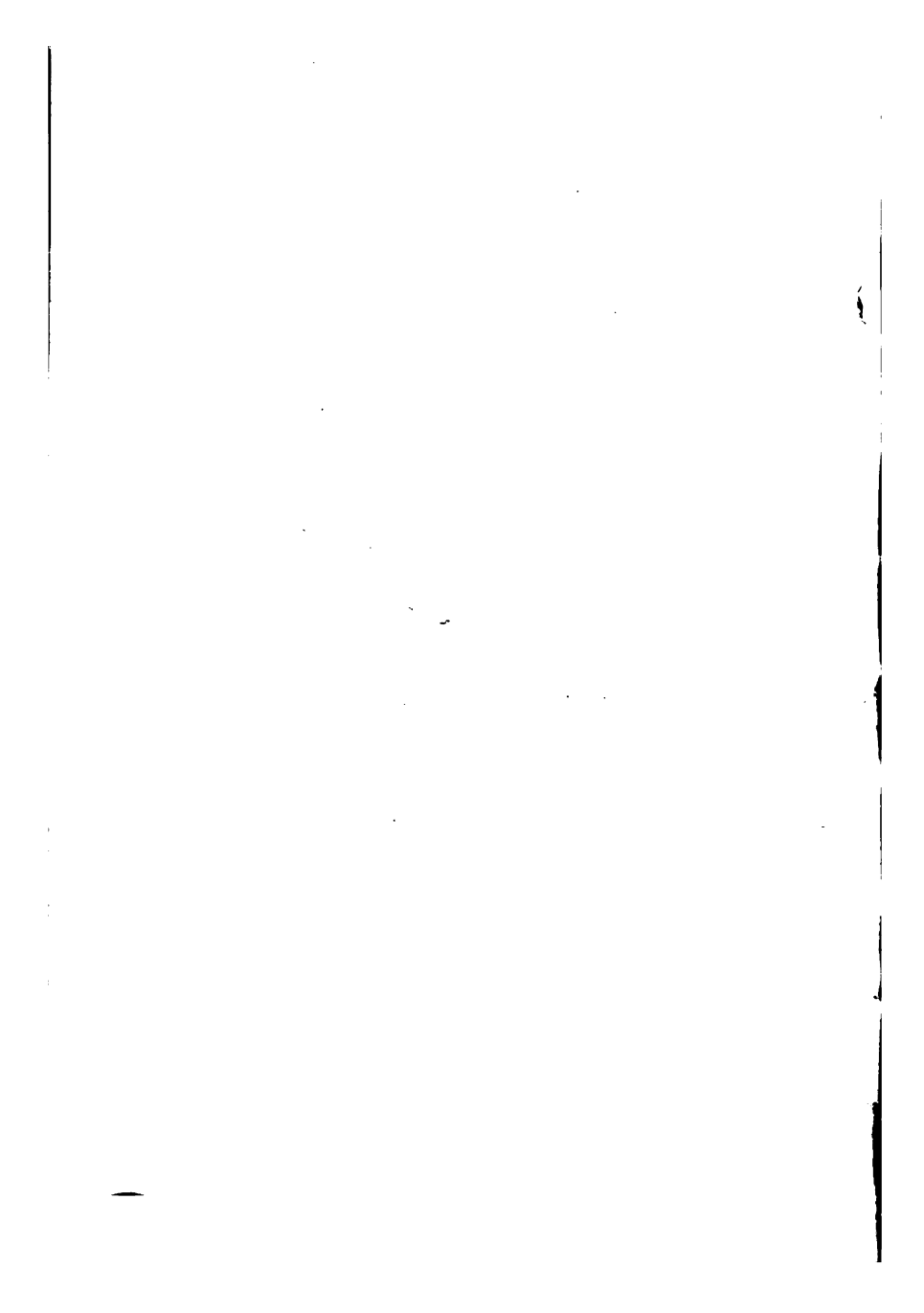




NOTE.

Most books have a preface at the beginning, where it is seldom *read*; this book has its preface appended, where it will be seldom *seen*.







FORCE.



I.

In the course of human progress, there came down from the twilight of the dark ages, in the science and practice of law, such complications, as trespass, trespass on the case, trespass on the case on promises, debt, assumpsit, replevin, trover and tort; with declarations, complaints, answers, demurrers, replications, rejoinders, rebutters, surrebutters, and various other forms of pleading, until the whole system had become so intricate, that the most learned and astute practitioner was

sometimes at his wit's end, and often found himself out of court.

About forty-five years ago, some genius conceiving the idea of combining common sense with law, succeeded in devising and introducing THE CODE, by which the whole system of pleadings was simplified, and reduced to actions at law, and actions in equity, which so revolutionized the practice as to make it quite intelligible, at least to those learned in the law.

In like manner there has come down from the remote past, in the science and study of physics, such complications and divisions of force, as energy, momentum, power, motion, velocity, and the relation, correlation, and conserva-

tion of forces, of the kenetic, vibratory, molecular, resultant, radiant, available, convertible, accelerated and potential varieties, changing and interchanging from one to the other, and rechanging to something else; until it may well be doubted whether the most learned and skillful scientist does not at times find himself a little dazed, out of court, and *almost* ready to admit, that A CODE might improve the study of physics, as well as the practice of law.

With this introduction of the subject, I will proceed with the argument.



II.

Science teaches us that *force* is that which acts upon matter, so as to change its form or condition; and that all visible changes in the universe result from the action of force upon matter.

The question naturally arises then, how, in what way, does force act upon matter, so as to change its form and condition?

To answer this question correctly, and intelligibly, although probably as never before answered, is the object of this paper.

In the last text book of physics published in Appleton's series in 1891, the learned author makes a broad distinc-

tion between *force* and *energy*, representing force as resulting from energy doing work, and then says (page 44), "A force, it will be seen, can have no capacity to do work."

Mr. Webster makes force and energy synonymous terms, meaning one and the same thing; I shall therefore follow Mr. Webster and use the term *force*, to express everything capable of changing the form or condition of matter.

Science also teaches us, that force is as indestructible as matter, and that no greater amount of force exists in the universe at one time, than at some other time.

It is evident then, that force does not result from conversion of something

else into force; and it must be equally evident and follow as a matter of course, that one force cannot be converted into or changed to some other force, as taught in text books, unless it so be that two or more forces unite to create a new force, as two or more kinds of matter unite to create a new kind of matter.

Nature stores up her forces in matter, in every conceivable form and condition in which matter is found to exist; so that every particle of matter becomes the store-house of some passive or dormant force.

Force is *active*, when it imparts motion to matter; it is *passive*, when stored up and lying dormant in matter.

Force does no work, except when it is active, as for example: electricity when stored up and lying dormant in the battery, is as passive and harmless as the lamb; but when liberated, it becomes the uncaged lion, trundling street cars, and whirling electric engines.

Electricity while it is a most powerful and tyrannical master, can be made a most docile and obedient slave.

Text books of physics, give this as the law governing force; "that whenever any amount of force *appears* at one place, an exactly equivalent amount of force *disappears* at some other place at the same time."

Is this law sound, and is it in fact the law governing force? If it is, it should

stand; but if found to be untrue or defective, it should be revised, amended or repealed.

It has been well said, that theories are guesses at truth, but that experiments prove the truth or the falsity of the guess.

Now let us see how this law will stand the test of experiment.

An immense amount of force can be stored up and lie dormant and harmless in a barrel of gunpowder, but when the active force of a *single spark* is applied to it, the force thus stored up is instantly liberated, and makes its appearance millions of times greater than the amount of force that has disappeared by the extinguishment of the

single spark.

Force makes its *appearance* when it is liberated; it *disappears*, when it is stored up in matter.

It seems conclusive then, that to make visible a great amount of force at one place, does not require the disappearance of an equivalent amount of force at some other place at the same time; *but that this law is based upon false premises, is unsound and should therefore be eliminated from text books.*

When force that has been stored up and lying dormant in matter is liberated in one place, its effect becomes visible in changing the form or condition of matter in some other place.

Thus when the force is liberated

from the cartridge placed in the gun, its effect becomes visible in the destructive work of the projectile thrown from the gun.

When force that has been stored up and lying dormant for ages, in the fuel placed under the boiler of the locomotive, is liberated, its effect becomes visible in the working engine, and moving cars.

The different forces are not stored up singly, but many or all existing forces are stored up at the same time in great abundance, in exceedingly small quantities of matter.

For example—from the food digested in the stomach, all of the forces are liberated that are necessary to

sustain life, promote the growth and carry on the functions of the animal economy; while large amounts are stored up in the muscles of the living body for future use; and when liberated from the arm of the blacksmith, manifests itself in the blows that fall upon the heated iron, and in the sound waves that salute the ear; and thus the form and condition of matter is changed.

The force that is liberated from the human hand when winding a watch, is stored up in the spring of the watch; and as again liberated, its work becomes visible in the moving hands upon the dial.

The force thus liberated from the

hand, and stored in the spring, is undoubtedly electricity.

III.

Force being indestructible as matter, it must be elementary like matter, and no conversion of matter into force can take place, nor can one force be converted into some other force, like the transformation of *muscular force* into *heat force* described in text books; and hence the only change that does or can take place, is the process of storing up and liberating forces that already exist, and in this way they so act upon matter as to change its form or condition.

Indeed, the learned author of the text book above quoted, seems at one

time to have entertained some faint idea, some vague conception of this storing and liberating process of the forces, when he says (page 40) "we must remember then, that nothing but energy can be the cause of energy."

He does not, however, attempt to explain, or in any manner illustrate his idea, by showing how one energy can be the cause of some other energy; but leaves the student in the dark, to work out the problem in his own way, as best he can.

Hence I will illustrate my conception of his idea, that energy can be the cause of energy, in this way: the *active force* of a single blow from a hammer, will liberate the *dormant force* stored up

in a ton of dynamite, quite sufficient to wreck the most substantial structure built by man.

To *cause*, is to *create*; but the energy of the blow from the hammer did not *create*, nor did it *cause* the great amount of energy or force that was evolved by the explosion of the dynamite; but it simply *liberated* forces already existing, and which had been accumulated in an immense amount, and stored up in a very small quantity of matter. When thus liberated, the force stored in the dynamite was free to act, and did not require any other energy to cause its action.

Energy does not act upon *energy*; it acts only upon *matter*, and cannot there-

fore be the cause of energy, except by liberating the dormant energy, stored in the matter acted upon.

This experiment seems to illustrate the author's idea, "that nothing but energy can be the cause of energy," so plain that even a freshman in physics can comprehend it.

A dormant force can only be liberated by an active force, and when so liberated, does not require the aid of some other force or energy to give it motion; but instantly of its own impulse, proceeds to change the form or condition of matter.





IV.

The various forces that we have to deal with, are properly divisible into three classes, viz: mechanical forces, vital forces, and mental forces; and besides what come within these classes, none will be found to exist since nature in her frugal economy, has hardly created two forces to do the same work.

The mechanical forces are intermittent, and at times appear to be somewhat irregular and erratic in character and action; but are nevertheless easily made subject to human control, are readily stored up in various forms and conditions of matter; made dormant or active at pleasure, and thus becomes

obedient and useful servants of man, for economic and mechanical purposes.

This class of forces, comprehend light, heat, electricity, magnetism and combustion.

All of these forces are stored up in matter, and that some of them at least occupy space, although not yet known to have weight, is a fact so palpable to the common understanding, that it must eventually be recognised by science.

Light displays its mechanical energy by the peculiar mechanical work it accomplishes in the Photographer's gallery; but with this exception, no mechanical power can be obtained from any of these forces, except by liberating it, from its storhouse of matter.

Combustion is one of the forces of nature, stored up and dormant in certain conditions of matter, and when liberated, it so acts upon matter, as to cause a change from its organic form, to its elementary condition, fitted and prepared to again go into the creation and growth, of new forms of life and beauty.

When elementary matter has once so united, as to create organic or compound bodies, in any of their various forms and conditions, there is no force or power known to man, that can again restore or reduce them to elementary matter, except combustion.

By this *force*, the equilibrium between elementary and organic matter is preserved.

From the very beginning, combustion seems to have been the *paradoxical enigma* of science; and it is not likely to be otherwise, until scientists are prepared to recognize the important truth, that combustion is one of the forces of nature, *counteracting cohesion, by taking apart and liberating the elementary matter, which that forces has bound together.*

Electricity which now plays such an important part amongst the mechanical forces, is divisible into light, heat and magnetism.

Primary colors could not result from the dispersion of light, if they did not first unite to create light; nor could light, heat and magnetism result from the decomposition of electricity, if they

had not first united in its creation. It may therefore be regarded as not only possible, but even probable, that electricity is not an original elementary force, but that it is created by the union of light, heat and magnetism; the intense mechanical energy of these subtle forces, so uniting as to create this *grand propulsive force of the universe*.

The vital forces are constant and unchanging, never varying in character and action, and no mechanical device, or invention of human skill or ingenuity, can increase or diminish the intensity of their action, or vary their course so much as the breadth of a hair.

This class includes attraction, gravity, affinity, cohesion and repulsion.

These forces are all stored up in matter, but none of them, with the exception of gravity, can be utilized for mechanical purposes; and that not by liberating it from the matter in which it is stored, as is the process in utilizing the mechanical forces, but by massing such matter so as to obtain the amount of pressure or weight, that will accomplish the work required.

The mental forces comprehend mind, memory, reason and judgment, all of which are stored up in the human brain, and when liberated, are in part stored in other brains, and in part in the printed pages of countless books, that

constitute the learning and wisdom of the world.

V.

Matter and force constitute the sum total of the universe; they act and react upon each other, and not upon any *imaginary something else*.

They come together and unite, by virtue of the great affinity they have for each other; *and when force is being stored up in matter*, elementary matter is taking on the form and condition of organic bodies; *but when force is being liberated from matter*, organic bodies are being restored to their elementary condition.

In this way, force so acts upon matter, as to change its form and condition.

Thus it will be seen that by adopting

the theory of *storing and liberating forces*, all of their bewildering complications with their interchanging characteristics, described in text books, but not half explained or understood, will be simplified and reduced to A CODE; by which all of the changes that take place in *matter and force*, are fully explained, and clearly defined in this one sentence:

Force exists in but two conditions, ACTIVE when changing the form and condition of matter; PASSIVE when stored up and dormant in matter.



APPENDED PREFACE.

This paper was read before the Wisconsin Academy of Science, Arts and Letters, at its annual meeting in December, 1892; but having been requested by some of its most active, energetic and zealous workers, not to state that fact upon the title page of this book, lest the Academy should suffer reproach; I have most cheerfully complied with the request, and state the fact here, where the proper explanation can be made, exculpating the Academy from any responsibility for this or any other paper that I have heretofore read, or may hereafter read, at any of its meetings, unless they appear in its published proceedings.

It would seem from this request, that it is not the purpose of the Academy

under its present management, to consider or investigate any *new idea*, or expression of thought, outside of the well worn channels, but to expend its best energies in threshing over the old straw, that has not yielded a new grain of truth in the past generation.

Suppose some of the ideas advanced in this paper are not scientifically speaking, *correct*—what of it? Has the good name and fair fame of the Academy been seriously impaired; or has science been paralyzed thereby?

It is comparatively but a short time in the history of the world, since a man of genius was sentenced to death for suggesting the *cranky idea*, that the earth was round, and turned over every day. That sentence was pronounced by the embodiment of all learning, wisdom and knowledge, both human

and divine, and yet the earth continued to turn over; and it may so be, in the economy of nature, the process of storing and liberating *forces* will still go on, notwithstanding the Wisconsin Academy of Sciences, Arts and Letters, is not yet prepared to admit it.

Suppose there should still be some unknown important truth, yet hidden away in the vast domain of scientific research, how is it to be discovered?

Evidently not by the Wisconsin Academy, for it effectually ignores and bars out all *new* ideas; and certainly not by studying text books, for they may be searched with a microscope, and nothing will be discovered that was known before the books were made.

It may yet dawn upon the enlightened wisdom of to-day, that there are some things that the Creator of the Universe

does not and *cannot* do, consistent with any rational system of economy, human or divine.

For example, He does not and cannot create trees, one hundred years old in a single day; no more does He create *non-combustible water*, out of *combustible gases*; or carry on the most brilliant and important works of creation, through the agency of *imaginary vibrations*, of an *ether* yet to be created.



